SUPPORT FOR THE AMENDMENTS

Claim 20 is amended to correct an obvious spelling error.

No new matter is believed added to this application by entry of this amendment.

Claims 2-9 and 12-26 are active.

REMARKS/ARGUMENTS

The claimed invention is directed to an electrical separator for a lithium battery, which provides good thermal stability and shutdown performance while being stable during processing in the manufacture of lithium batteries and a process for the manufacture of the electrical separator. Applicants have described the properties necessary to be an electrical separator on page 1, lines 11-14 of the specification as:

> "The separator is customarily a thin porous insulating material possessing high **ion perviousness**, good mechanical strength and long-term stability to the chemicals and solvents used in the system, for example in the electrolyte of the battery. In batteries, the separator should fully **electronically insulate the cathode from the anode**, but be pervious to the electrolyte."(Bold added)

Applicants respectfully submit that ion perviousness indicates that the separator allows passage of ions through the pores but does not actively conduct ions through ion conduction. Applicants have further described the separator as having high electrical resistance (page 9, lines 16-17) and not containing metals (page 2, lines 21-25):

> "Preferably, however, the porous carriers used for the separators according to the invention are not electroconductive carriers such as woven metal fabrics for example, since the use of such carriers can give rise to internal shortcircuiting when the ceramic coating on the carrier is incomplete. Separators according to the invention therefore preferably comprise carriers composed of nonelectroconductive materials."

No such electrical separator for a lithium battery is disclosed or suggested in the cited references.

The rejection of Claims 2-9 and 12-26 under 35 U.S.C. 103(a) over Shi et al. (U.S. 2005/0014063) in view of Hying et al. (WO99/62620, equivalent to U.S. 6,620,320) and Takita et al. (U.S. 5,922,492) is respectfully traversed.

Shi describes a battery separator having a nonwoven flat sheet, a microporous membrane having low temperature shutdown properties and an adhesive bonding the nonwoven flat sheet to the microporous membrane which is adapted for swelling when contacted by an electrolyte. (Claim 1) The nonwoven and/or its fibers may be coated or surface treated with ceramic material [0014]. Shi provides no description of the nature of or a method to prepare the ceramic coating.

Hying describes ion-conducting composites for chemical and physical processes such as electrodialysis, electrolysis and chemical catalysis. The composite material contains ionic groups such as sulfonic acids, phosphoric acids, carboxylic acids to impart ion conductivity to the membrane (Claim 1).

Hying states (Col. 2, lines 22-24):

> "Not only good conductivity but also the greatest possible permselectivity is necessary for use of membranes in electrodialysis or as a proton-conducting membrane in fuel cells."

Moreover, Hying requires at least one compound of a metal, a semi-metal or a mixed metal coating on a support (Col. 1, lines 50-54), and describes that "ion conduction takes place in the form of a surface diffusion mechanism."(Col. 2, lines16-17)

Applicants have previously argued that Hying and Shi are directed to nonanalogous art and the Office has responded that both references fall under the genus of ion-conducting materials and therefore "one skilled in the art would have looked in the general field of ion conducting materials to modify a subset of ion-conducting materials, such as battery separators."(Official Action dated October 17, 2008. page 9, lines 8-9) The Office has stated that:

> "Hying et al. directly mentions fuel cells (an electrochemical device similar to a battery) and more broadly mentions the ion-conducting materials of its invention may be used for other electrochemical reactions (Col. 1, lines 7-19)." (Official Action dated October 17, 2008. page 9, lines 5-8)

Applicants respectfully submit that Shi is directed to a battery separator which as described by Applicants (page 1, lines 13-14) "should electronically insulate the cathode from the anode, but be pervious to the electrolyte." Applicants submit that in a battery separator no chemical interaction takes place between the electrolyte and separator surface. In contrast, Hying is directed to an ion-conducting composite which actively conducts ions by a surface diffusion mechanism or catalyses chemical reactions by interaction with the membrane surface components such as sulfonic acids, phosphoric acids, carboxylic acids.

In a Precedential Opinion rendered by the Board of Patent Appeals and Interferences (Ex parte Whalen II, Appeal 2007-4423, p. 16, lines 5-9, decided July 23, 2008 the Board stated:

> The KSR Court [KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007) noted that obviousness cannot be proven merely by showing that the elements of a claimed device were known in the prior art; it must be shown that those of ordinary skill in the art would have had some "apparent reason to combine the known elements in the fashion claimed."

The Board further stated (Id. p.16, lines 17-25):

> The Examiner has not persuasively explained why a person of ordinary skill in the art would have had a reason to modify the compositions taught by Evans, Greff'767, or Taki in a way that would result in the compositions defined by the claims on appeal. Therefore, The Examiner has not made out a prima facie case of obviousness under 35 U.S.C. § 103.

Applicants respectfully submit that Shi is directed to a battery separator which is pervious to an electrolyte while Hying is directed to an ion-conducting membrane which chemically interacts with the material being transported. The two references do not pertain to

the same field of endeavor, do not deal with the same problem, and are nonanalogous art. The Office has not explained why a person of ordinary skill in the art would have considered a reference dealing with the formation of an chemically active ion conducting membrane to solve a problem associated with a pervious non-chemically active battery separator. Accordingly, the Office has not met its burden to show a prima facie case of obviousness.

Moreover, Applicants respectfully submit that Hying requires the porous inorganic nonelectroconductive coating be on the surface of the membrane where it can interact with the ion to be transported (Col. 8, lines 33-40) as required for ion surface diffusion. Shi is directed to a separator which is pervious to an electrolyte and does not chemically interact with the electrolyte. The Office has not explained why or how one of ordinary skill in the art would combine the Hying coating with the separator of Shi without altering the principal of operation of the primary reference. Applicants respectfully submit that such combination would either render Shi unsatisfactory for its intended use or change its principle of operation (MPEP 2143.01 V. and VI.)

Takita is cited to show a membrane porosity of 30-70%. Takita describes a microporous polyolefin composite membrane comprising a microporous polyolefin membrane and a polyolefin nonwoven fabric laminated on at least one surface of the microporous polyolefin membrane. This reference does not provide a cure for the deficiency of the Shi/Hying combination described above. Takita does not disclose or suggest a porous inorganic nonelectroconductive coating.

In view of all the above, Applicants respectfully submit that the cited combination of references can neither anticipate nor render the claimed invention obvious and withdrawal of the rejection of Claims 2-9 and 12-26 under 35 U.S.C. 103(a) over Shi in view of Hying and Takita is respectfully requested.

The rejection of Claims 2-9 and 12-26 under 35 U.S.C. §112, first paragraph, is respectfully traversed.

Applicants have described on page 10, lines 24-26, that the sol can contain Al by stating:

"The suspension used for producing the coating comprises at least one oxide of aluminum, of silicon and/or of zirconium and at least one sol of the elements Al, Zr and/or Si and is prepared by suspending particles of at least one oxide in at least one of these sols."

As described on pages 11-13 of the specification, the sol is treated and becomes the material adhering the oxide particles. As Al is described as an element of the sol (see also Page 10, line 30, bridging to page 11), the description of Claim 25 is fully supported.

The description of Claim 5 stating "mixtures thereof" is supported in the specification on page 8, lines 3-8, as follows:

> "The shutdown layer which, according to the present invention, is a present on the inorganic layer can consist for example of natural or artificial waxes, (low-melting) polymers, for example specific polyolefins, for example polyethylene or polypropylene, or **polymer blends or mixtures**, in which case the material for the shutdown layer is selected so that the shutdown layer will melt at the desired shutdown temperature and close the pores of the separator, substantially preventing any further ion flux."(Bold added)

In view of the above cited support, Applicants respectfully request withdrawal of the rejection of Claims 2-9 and 12-26 under 35 U.S.C. §112, first paragraph.

The rejection of Claims 2-9 and 12-26 under 35 U.S.C. §112, second paragraph, is respectfully traversed.

Applicants respectfully submit that the test for definiteness under 35 U.S.C. § 112, second paragraph, is whether "those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565,1576, 1 USPQ2d 1081,1088 (Fed. Cir. 1986).

Applicants have described the shut down temperature at numerous places throughout the specification, for example, on page 2, lines 7-9, as:

> "At a certain temperature, the shutdown temperature, the PE will melt and the pores of the separator become closed and the current circuit is interrupted."

On page 3, lines 26-30, Applicants state:

> "The present invention further provides a process for producing a separator having a shutdown function, which comprises a porous inorganic layer of a separator having applied to and fixed on it a porous sheetlike structure as a porous layer (shutdown layer) composed of a material which has a defined, desired melting temperature which is not more than the melting temperature of the carrier material and less than the melting temperature of the inorganic layer."

On page 8, lines 3-16, Applicants state:

> "The shutdown layer which, according to the present invention, is a present on the inorganic layer can consist for example of natural or artificial waxes, (low-melting) polymers, for example specific polyolefins, for example polyethylene or polypropylene, or polymer blends or mixtures, in which case the material for the shutdown layer is selected so that the shutdown layer will melt at the desired shutdown temperature and close the pores of the separator, substantially preventing any further ion flux. Preferred materials for the shutdown layer are shutdown layer materials which have a melting point of not more than 180°C and preferably less than 130°C. It is particularly preferable for the separator according to the present invention to comprise, as material for the shutdown layer, a material which has the same or a lower, preferably a lower, melting point as the material of the carrier or portions thereof. Preferably, the melting temperature difference between carrier material and shutdown layer material is at least 10 K. The use of materials which bring about shutdown at relatively low temperatures makes it possible to very substantially avoid melting or flaming of the materials surrounding the batteries, such as housings or cables for example."

In view of the above, Applicants respectfully submit that one of ordinary skill in the art would recognize that the composition of the shutdown layer can be adjusted to have a melting temperature at a specific shutdown temperature which is determined by the design and components of the battery as well as the required safety designed into the battery.

Accordingly, withdrawal of the rejection of Claims 2-9 and 12-26 under 35 U.S.C. §112, second paragraph, is respectfully requested.

Applicants respectfully submit that the above-identified application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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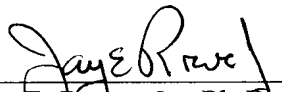

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